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Title: Production Qualification Training Course 8 of 8 Engineering Evaluation
Overview

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Production Qualification Training

Course 8 of 8

Engineering Evaluation Overview

Joint Initiative: W-8 Group and ALDW-DAQ

Curriculum Overview

This curriculum is intended to:

- Teach you about the Engineering Evaluation Process
- Explain the course subject in detail
- Provide references and guides that will help beyond this training



Utrain Course	Procedure	Title	Course #
RR 49297	W-SE-0008	Engineering Authorization System	Course 1
RR 49256	W-SE-0044	Production Qualification Procedure	Course 2
	W-DG-0003	Engineering Evaluation Plan Template	Course 2
	W-DG-0004	EE Data Package Template	Course 2
	W-DG-0005	Engineering Evaluation (EE Data Package Checklist)	Course 2
RR 49262	W-SE-0046	Administrative IER and SIER/B Procedure	Course 3
RR 49272	W-SE-0051	Definition IER and SIER Procedure	Course 4
RR 49273	W-SE-0052	DER, AER, CER Procedure	Course 4
RR 49268	W-SE-0048	Re-evaluation Notices (RENs) Procedure	Course 5
RR 49256	W-SE-0049	Engineering Evaluation Release Procedure	Course 5
RR 49271	W-SE-0050	Qualification Evaluation Release Procedure	Course 5
RR 49298	W-SE-0047	Advanced Change Orders, Final Change Orders, and Engineering Change Requests Procedure	Course 6
RR 49257	W-SE-0045	SXN/SXR Procedure	Course 7
RR 53083	TBD	Engineering Evaluation Overview	Course 8
	W-DG-0002	EA Cheatsheet and Checklist Desktop Guide	All



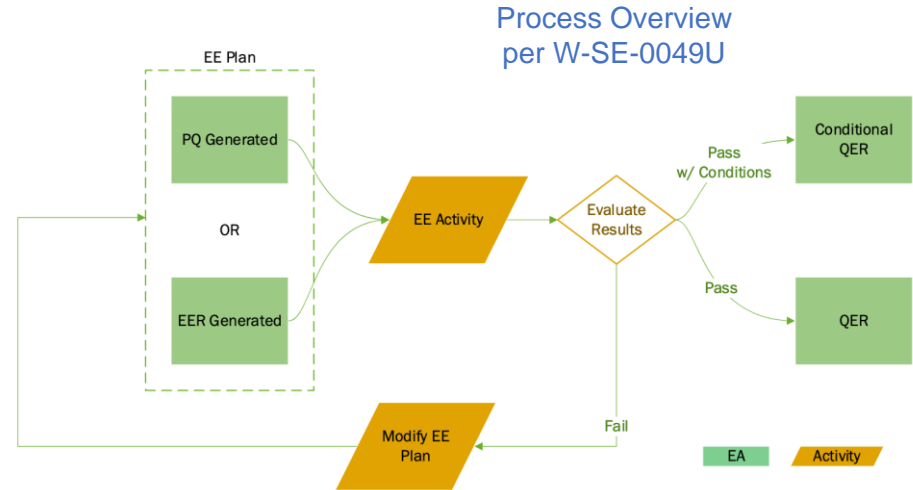
Training Objectives

- At the end of this training, you will:
 - Become familiar with the Engineering Evaluation process
 - Understand the structure of LANL procedure usage for EAs
 - Know where to gain assistance in executing engineering authorizations
- What this training will not do:
 - Authorize you to author or approve EAs
 - Train you on how to navigate the EA tool (Arbortext), PDMLink, or PRIME



Engineering Evaluation (EE)

- The Design Agency (DA) uses the Engineering Evaluation (EE) process to validate that the Production Agency (PA) can manufacture product meeting the product definition in a consistent and reliable manner
- Acceptable completion of the EE process is documented by the release of a Qualification Engineering Release (QER) authorizing the use of the products or processes to meet Directive Schedule production requirements



A significant part of production qualification process involves activities associated with the EE



Engineering Evaluation

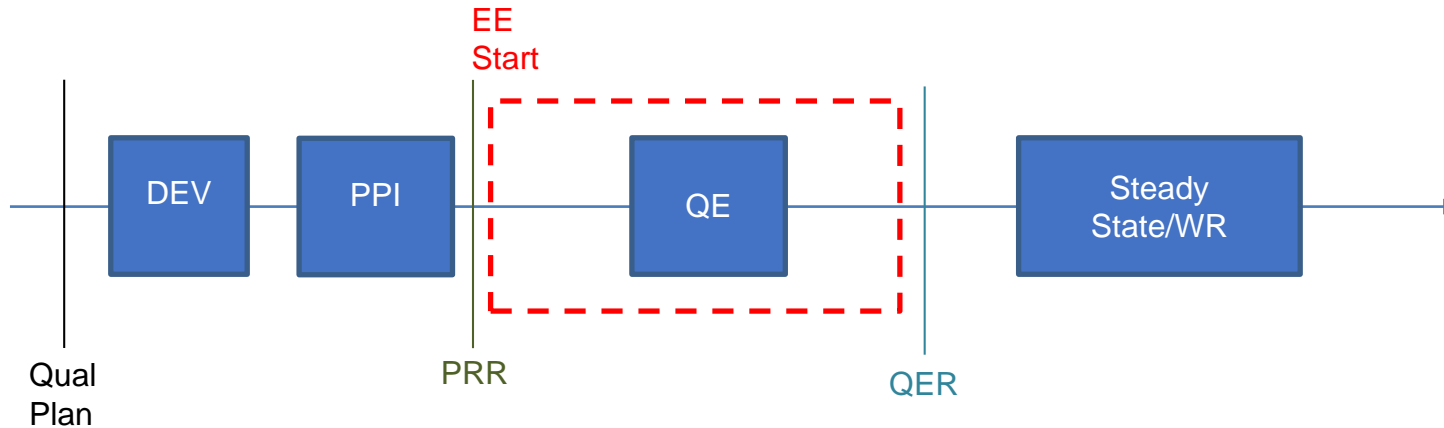
- The EE is performed by both DA and PA, but issuance of the Qualification Engineering Release (QER) is the prerogative of the DA
- The PRT forms the EE team with SMEs from both DA and PA
 - Typical makeup for LANL DA EEs:
 - DA team: Production Liaison Engineer (EE team lead); Systems Engineer (B61, W76, W78, W88); Material/Process SMEs (sometimes from E, C, MST, etc.)
 - PA team: Product Engineer (PA EE team lead); Process Engineer (Typically lead for PX); PA Quality Engineer; Tooling Engineer (as applicable)



Engineering Evaluation

When is it performed?

DEV--Development Engineering
PPI--Process Prove-In
QE--Qualification Engineering
PRR--Production Readiness Review
WR--War Reserve



Engineering Evaluation

Where is an Engineering Evaluation Performed?

- Walk downs performed at the PA and/or its subvendors using equipment/facilities that are intended to be part of the qualified process
- Tabletop portions may be performed in person or via teleconference



Engineering Evaluation

Why perform an Engineering Evaluation?

- To ensure that the production processes or products meet the product definition requirements
- To ensure process control
- To ensure the DA design definition is adequate
 - Over-constrained?
 - Under-defined?

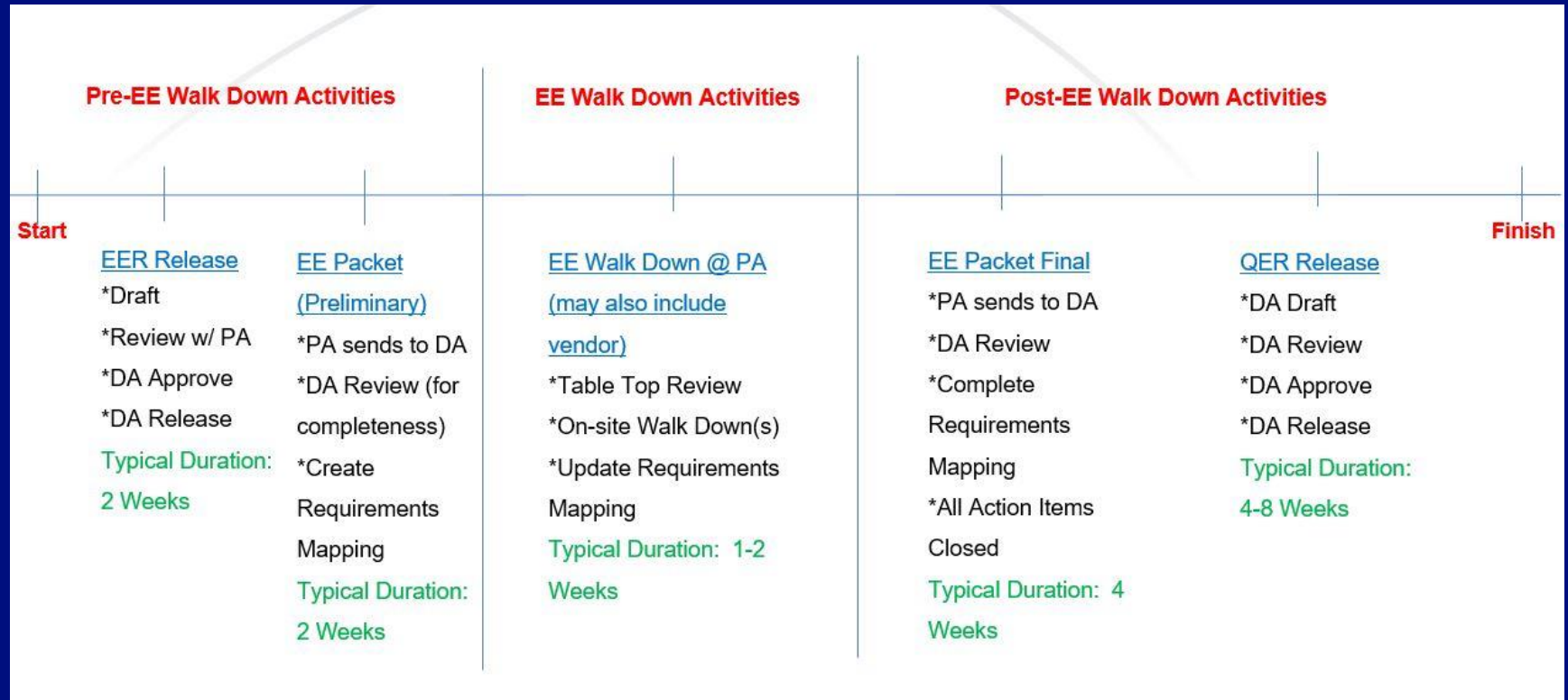


Design Definition

- **What requirements need to be met?**
 - Drawing set
 - Product Specification
 - Material Specification (RM or 7-digit)
 - General Requirements (9900000, if called out in design definition)
 - Marking, General Methods (9919100, if called out in design definition)
- **Where do I find a list of document types?**
 - T030 Product Documentation Types
- **How do I access the documents I need?**
 - PDMLink, PRIME, distribution from DA



Engineering Evaluation



Engineering Evaluation Evidence

What types of evidence should the PA provide?

- Minimum product definition and requirements mapping
- EAs applicable to the EE
- Work instructions
- Training records
- Equipment calibration and tolerance analysis
- Equipment maintenance records/plans, if applicable
- Material procurement data
- Process capability assessment (e.g. FMEA, MSAs, etc)
- Acceptance data for QE lot parts/material
- Producibility basis and status
- Nonconformance handling evidence
- SQA, if applicable
- Tooling inspection and certification, if applicable



Engineering Evaluation Results

- **What do the results look like?**
 - **Findings:** Items that must be addressed due to potential effect on quality of final product
 - **Observations:** Recommendations by EE team members to improve process parameters that are not expected to result in negative effects on quality
- **How are these communicated?**
 - PRT decides how to document and communicate closing of findings and observations
 - Email and/or spreadsheets
 - Revisions to EE plan



Qualification Engineering Release

- **What is a QER?**
 - A release that assigns qualification status of a product, process, software, acceptance equipment, or system test equipment, and (if the evaluation results are satisfactory) authorizes the listed items for an intended use

- **Does a released QER always indicate the process is acceptable?**
 - **“Acceptable”** status is assigned when product may be used for Directive Schedule Use
 - **“Conditional”** status may be assigned if specified product is acceptable for Directive Schedule use but EE requirements have not yet been satisfied
 - **“Expired”** status may be assigned if an issue with the process is identified during steady-state production



Qualification Engineering Release

- **What could invalidate the QER?**
 - Inactivity of 12 months or more. If the process has not been exercised in 12 months or more, the PA must issue a REN to resume the process unless stated otherwise in the product definition
 - Identification of a situation that calls into question product that has been accepted under the existing QER



Re-Evaluations

- **What does the PA do when they change their qualified process?**
 - Significant change - Issue REN against acceptable QER
 - Minor change - REN not required



Re-Evaluations

- **What are some examples of “significant changes” that may require re-evaluation?**
 - When acceptance or test equipment requires excessive repair or maintenance
 - When calibration procedures for the equipment undergo a significant change
 - When equipment is moved to a new location
 - When a significant change to operating procedures or tooling is made



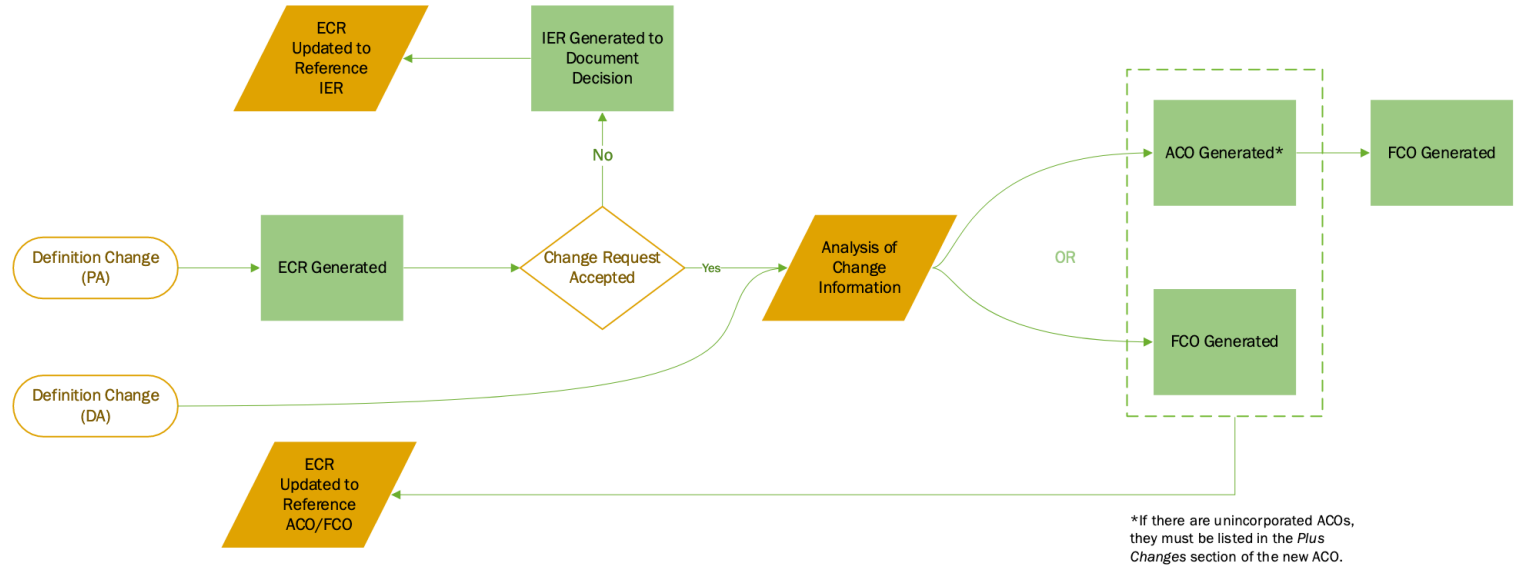
Steady State Production

What if a product doesn't meet spec? What does the PA do?

- Rework, if authorized
- Scrap
- Issue an Specification Exception Notification (SXN) to the DA
 - DA evaluates nonconformance and responds
 - IER rejecting deviation (Scrap parts)
 - SIER directing specific rework
 - Unrestricted SXR authorizing deviation for any use
 - Restricted use SXR authorizing deviation only for limited use



Updates to Specification



EA

Activity

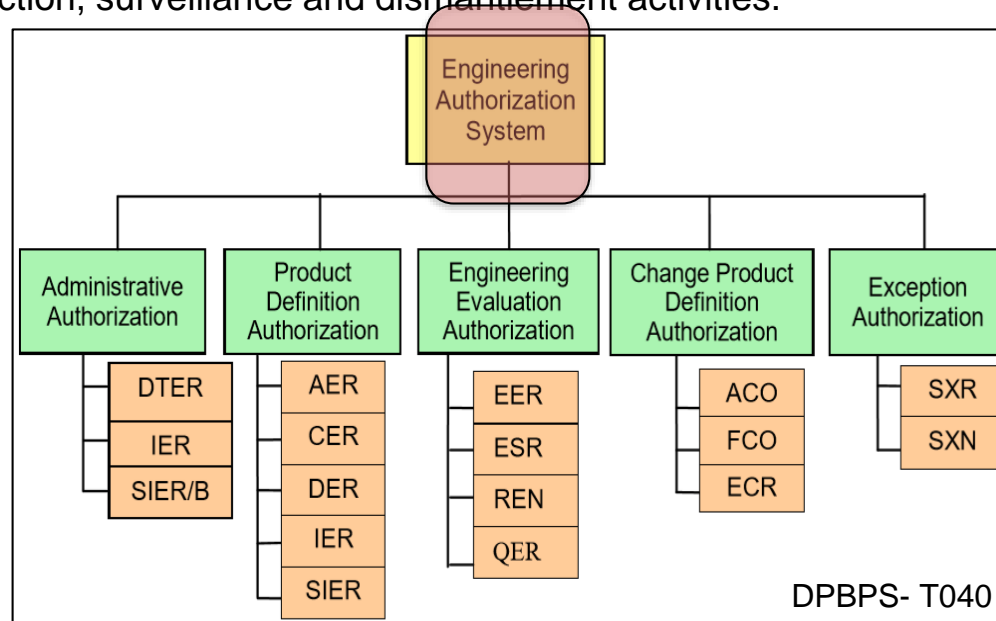
Process Overview
per W-SE-0047U



Engineering Authorization System Overview

The Engineering Authorization (EA) System provides a formal communication method among M&O contractors, including configuration control and record management of EAs.

EAs authorize actions that affect product definition and related product and document information related to development, production, surveillance and dismantlement activities.



Site Codes and CAGE Codes

NNSA Integrated Contractors	Site Code	CAGE Code
Sandia National Laboratory California	SL	14214
Sandia National Laboratory New Mexico	SA	14213
Lawrence Livermore National Laboratory	LL	14067
Los Alamos National Laboratory	LA	88516
Kansas City Plant	KC	14061
Nevada National Security Site	NV	4WT95
Pantex Plant	PX	14911
Y-12 Plant	OR	88930
Savannah River Site	SR	14063



Production Readiness Review

- Demonstrate that product definition, cost, and schedule requirement can be met
- Design Agency verification of adequacy of design and test results
- Procuring Agency verification of Producibility
- Assessment of ability of system to meet its nuclear explosive safety requirements
- Demonstration that MRL Level 7 and TRL Level 7 have been achieved
- Weapon Safety Specification



Producibility Assessment

What is it?

- An assessment of capability of PA to manufacture a product
 - Yield
 - Cycle times
 - Cost
 - Tooling Availability
 - Personnel training and availability
 - Rework prevalence

Why does it matter?

- The Producibility must reach an A, B or C before an acceptable QER is issued, or documented FPM approval



References

Number	Title	Website
DBBPS -T030 DBBPS -T040 DBBPS- C047 DBBPS- C048	<i>Product Documentation Types</i> <i>Engineering Authorization System</i> <i>Conduct Technical Readiness Level (MRL)</i> <i>Assessment</i> <i>Conduct Producibility Assessment</i>	https://dpbps.sandia.gov/SitePages/homepage.aspx
W-SE-0008U W-SE-0047U W-SE-0049U	<i>Engineering Authorization Procedure</i> <i>Advanced Change Orders, Final Change</i> <i>Orders, and Engineering Change Requests</i> <i>Procedure</i> <i>Engineering Evaluation Release Procedure</i>	https://int.lanl.gov/org/ddw/alldw/office-design-agency-quality/design-agency-procedures/system-engineering-procedures.shtml
ADW-Q-0001	<i>Los Alamos National Laboratory Design Agency</i> <i>Weapons Quality Assurance Program</i>	https://int.lanl.gov/org/ddw/alldw/office-design-agency-quality/index.shtml
NAP 401.1A	<i>Weapon Quality Policy</i>	https://prp.sandia.gov/SitePages/Home.aspx



Resources

When you have issues or questions regarding the Engineering Authorization System, there are resources you can go to:

- ALDW Office of Design Agency Quality (ALDW-DAQ)
- Production Liaison Group (W-8)
- Engineering Authorization Team (W-11)
- W- and Q- Division Group Leaders
- This training



Acronyms

DTER	Drawing Transfer Engineering Authorization
IER	Information Engineering Authorization
SIER/B	Special Instruction Engineering Release/B Authorization
AER	Advanced Engineering Authorization
CER	Complete Engineering Authorization
DER	Development Engineering Authorization
SIER	Special Instruction Engineering Authorization
EER	Engineering Evaluation Authorization
ESR	Evaluation Status Release



Acronyms (continued)

REN	Reevaluation Notification Authorization
QER	Qualification Evaluation Authorization
ECR	Engineering Change Request Authorization
ACO	Advanced Change Authorization
FCO	Final Change Authorization
SXN	Specification Exception Notice Authorization
SXR	Specification Exception Authorization
DA	Design Agency
PA	Production Agency
DPBPS	Defense Programs Business Process System
M&O Contractors	KCNSC / LANL / LLNL / NNSS / PX/ SNL / SRS / Y-12



Acronyms

- ACO—Advance Change Order
- CER—Complete Engineering Request
- DA—Design Agency
- DER—Development Engineering Release
- DEV—Development Engineering
- DTER—Drawing Transfer Engineering Release
- ECR—Engineering Change Release
- EE—Engineering Evaluation
- EER—Engineering Evaluation Release
- FCO—Final Change Order
- FMEA—Failure Modes and Effects Analysis
- FPM—Federal Program Manager
- IER—Information Engineering Release
- PA—Production Agency
- PPI—Process-Prove-In
- PQ—Qualification Plan
- PRR—Production Readiness Review
- PR—Production Review
- PRT—Production Realization Team
- QE—Qualification Engineering
- QER—Qualification Engineering Release
- REN—Re-evaluation Notification
- SIER—Special Instruction Engineering Release
- SQA—Software quality assurance
- SXN—Specification Exception Notification
- SXR—Specification Exception Release



Course 8: Complete

